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ABSTRACT

Current research on applications of computer conferencing in six institutions identifies a number of common problems related to communications and conferencing software and hardware and user attitudes about the medium. Despite these difficulties, there have been indications of a growth in the incorporation of computer conferencing in distance education activity. Issues requiring more careful consideration if computer conferencing is to make a greater impact on distance education include: (1) scale (expansion of computer conferencing capability to larger groups while at the same time assuring that low-socioeconomic status groups have access); (2) integration (incorporating computer conferencing into existing distance education programs); and (3) optimization (deciding where the medium can be used most effectively). While the major emphasis to date has been on enhancing the learning process by encouraging group learning and facilitating peer counseling and tutor feedback, other potential applications include enhancing group processes during course development and facilitating the management of decentralized distance education infrastructures by reducing the necessity to travel large distances for staff meetings. Further research is required on suitability of conferencing software for specific purposes, cost implications, and modification of software to suit individual user needs. Because of its capacity to bring people closer together without necessitating physical movement, computer conferencing has larger societal and global implications. (26 references) (GL)

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COMPUTER CONFERENCING IN DISTANCE EDUCATION

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An introduction

Computer conferencing (CC) refers to communication between or amongst individuals separated by time and space via telephone lines, personal computers and modems through a host mainframe computer. The latter, in housing the conferencing software and storage facilities for conference proceedings, performs a useful mediating role in the activity. **Computer conferencing** enables a group of users to carry on a conversation on any issue of common concern while separated by time and space from one another. It is however, but only one form of computer-mediated communication (CMC), that is systems based on the communications functions and capability of computers. Other commonly known forms of CMC applications are electronic mail services (e-mail), bulletin boards and electronic database accessing. The **e-mail** facility of CMC systems works very much like our regular postal services. Messages are sent down the telephone line and stored on 'electronic mail boxes' on a mainframe host computer for accessing by the addressee at his or her convenience. The communication is personalised, asynchronous and definitely faster than regular postal services. The **electronic bulletin board** facility of CMC on the other hand, is a space on the system where pieces of information for general consumption can be posted. Information on the bulletin board could be added to by any user but amended or deleted only by certain authorised personnel. Electronic bulletin boards on CMC systems offer a fast and convenient facility for essential information dissemination in

any work environment. **Electronic database accessing** facility of CMC systems enables individual users to gain access to, and if allowed retrieve information stored from databases on mainframe or minicomputers elsewhere. This facility of CMC systems offers tremendous hope for the distance learner who could from a distance use it to gain access to useful information such as past exam questions and model answers that might be stored on a mainframe computer.

Indeed CMC as a whole offers much scope for a variety of applications in the distance education (DE) environment. These have been explored amongst others, by Bates (1986) in great detail and very ably. This paper focusses on the application in DE of computer conferencing in particular, which is by scope and potential 'qualitatively' different from other applications of CMC listed above. It begins with a review of current research and applications of CC in DE, attempts to briefly analyze the existing experience and its direction and then concentrates on some prospects and directions for future research work in the area.

Current research and applications

There have been to-date very few documented applications of CC in distance education. Among the pioneers are the New York Institute of Technology (Haile & Richards, 1984), the Ontario Institute of Studies in Education (Davie, 1987, 1988), the United Kingdom Open University (Bates, 1986, 1988; Kaye, 1987; Mason,

1987, 1988) and the Empire State College (Roberts, 1988), Rochester Institute of Technology (Bissell et al., 1987), the NKI in Norway (Paulsen & Rekkedal, 1988).

The New York Institute of Technology (NYIT)

In 1983, the NYIT experimented with an electronic mail facility for communication between its instructors and part-time distance students who were separated by time and space from one another. The results of this were very encouraging and in the following year the institution adopted the use of CC with the PARTICIPATE (PARTI) system. PARTI is a conferencing software developed by Participate Systems Inc. (PSI) of Winchester, Massachusetts. It is a branching tele-conferencing system which allows for conferences in an educational milieu to be organised around specific courses, topics and activities within these courses such as individual student assignment activity, group projects and presentations.

This facility for creating branch conferences on the system greatly increased the NYIT mentor's options in the organization of his subject matter in a range of interesting ways. Intensive discussions could continue if necessary, in the branches without interfering with the main course conference. Groups of students could proceed with their work at any preferred pace, without holding up others. Separate conferences could be created to discuss quiz results as well as private concerns or problems of particular students in a group therapy fashion. Students were

encouraged to interact with one another by discussing topics and sharing solutions to issues presented in the main course conference. The mentor provided positive feedback on each of their conference contributions.

The first NYIT CC participants in 1984 were volunteers. They were loaned the basic equipment for a eight-week course and with it a self-instructional manual on the use of the PARTI system. Students had access to technical support via the telephone and in person where possible. The principal objective of this pilot project was to show that CC had the potential to service some of the circumstantial constraints (difficulty with sustaining motivation and isolation) and preferences (informal, flexible self-willed learning styles) of adult distance learners. While a follow-up analysis of student time on the system compared with their final grade in the course did not indicate any significant correlation between the variables, CC students had achieved comparable grades with their non-CC colleagues. CC as a course component received enthusiastic support and 95% of the pilot students indicated that they would like to take additional courses with computer tele-conferencing components (Haile, 1984).

The Ontario Institute of Studies in Education (OISE)

As part of its mandate in graduate, adult and continuing education OISE has, especially over the last 3 to 4 years incorporating computer conferencing in some of its programs. It too uses the PARTI system. One of OISE's first efforts in this

regard was in the context of one of its advanced level distance education courses (Davie & Palmer, 1985). It hoped that some of the many often claimed difficult features of DE such as isolation of the learner, delayed feedback, an institution's own inability to cater for individual learner needs through a common course materials package and the learner's inaccessibility to library resources and databases would perhaps be best served by the many strengths of CC. These strengths were identified as the possibility for fast, private and asynchronous communication between learners and their tutors, opportunity for group communication and potential for a non-threatening, non-dominative learning environment (Boyd, 1987).

It was discovered that while this was generally true, there were several difficulties with the incorporation of CC in DE, the seriousness of which were not all too clear at the start. Some of the obvious ones were, inaccessibility of basic equipment (i.e. personal computers), a lack of adequate training in the use of the conferencing software, a lack of requisite desire on the most part to communicate via this means, a lack of adequate leadership on the part of the tutors/mentors and a lack of a 'critical mass' (i.e. a sizeable group of willing participants at each site). Other deterrents were poor typing skills and a lack of comfort and self-confidence in students' ability to compose/edit messages on the CRT without having to download, and printing text, drafting their own responses to it, and then typing it in for uploading. Moreover, not all of the instructors

favoured CC as a worthwhile innovation. Many saw it as threat to established patterns and standards of pedagogy.

Subsequent efforts in the application of CC at OISE reported by Harasim (1986, 1987) and Davie (1987, 1988) have uncovered general favorable support for the medium as a course component but having no significant differential impact on student persistence and/or achievement. Davie (1987) in a study of 'facilitation of adult learning' through CC reported that while students commented favorably on their experience of jointly writing assignments via the conferencing system no interaction was noticeable between student learning styles and their participation in CC activity. Student learning styles were defined as 'accommodators, divergers, assimilators, and convergers'. Nevertheless it was felt that improved facilitation skills on the part of tutors and managers would still be helpful in enhancing the impact of CC in DE.

At OISE there have also been experiments with CC as a group learning device with the potential to simulate the educational community on-campus (Harasim, 1986, 1987). Participants engaged in 'electronic seminars' in small working groups in a learner centered approach to their studies. Overall, students were positively disposed towards the approach and actively participated in the sessions throughout. Difficulties reported included information overload, delayed responses due to asynchronous communication, inconvenience created by increased access, inability to follow sometimes disjointed on-line

communications, lack of visual cues from participants and health concerns such as eye strain caused by working at a computer terminal station for extended periods at a time. Several advantages of on-line group communication via a conferencing system were also reported. These included increased interaction, access to group knowledge and support, a fairly democratic learning environment, convenience of access, user control of learning interaction, and text-based communication.

The United Kingdom Open University (UKOU)

A major provider of distance education opportunities in the United Kingdom, the UKOU has been for sometime now variously experimenting with CC. Some of these have been with the work of their tutors and course delivery modes. The UKOU recently hosted a conference at Milton Keynes on computer-mediated communication in distance education with a particular focus on computer conferencing (October 7-11, 1988). Some of the UKOU's in-house features have been quite complementary in its adoption of and experimentation with CC. These are, its preoccupation with DE activity, a team approach to instructional materials and course development activity, and a decentralised tutorial support system.

Some of their earlier experimentation with CC as enhancing group learning very quickly revealed that providing users with a microcomputer, a modem and conferencing software did not lead to successful use of CC. There had to be a need to communicate via

this means. Following from this Mason (1987) suggested that perhaps some benefit might accrue from using 'coercive techniques' in the incorporation of CC in DE. This could be achieved by making CC integral to the course content and its assessment. The UKOU tutors themselves suggested that the experimenters ought to be putting 'stuff on-line' that they could not get any other way, then only would they use it. They noticed that CC demanded a considerable change in people's working habits and that this was not going to be easy or even possible if 'bugs' in the system such as delays due to asynchronous communication, 'too much rubbish' (i.e. information overload), and disjointed, incoherent communication were not removed.

Currently, at the UKOU much larger applications of CC are in place (Kaye, 1987). Some of the courses in focus are DT200: An Introduction to Information Technology, M205 and M371 with between 1500-2000 students in each. The conferencing software being used is CoSy (Guelph). Some formative evaluation of its impact carried out and reported by Bates (1988) says that the majority of the students are expressing ease and satisfaction with their experience in using CC in their studies. A large number of students though are complaining about the increased time demands of CC which is incorrectly reflected in their TMAs. Many are also finding that they have little time left for conferencing generally after expending much of their time doing the required work.

The Empire State College/Rochester Institute of Technology and NKI,Norway

Applications of CC in distance education activity have been attempted on smaller scales at these institutions also.

The Empire State College of the State University of New York is reputed for its extensive use of mentors to support its distance teaching activity. In the Spring of 1987 a pilot in the application of CC was undertaken with a course on American Diplomacy. Conferencing software used was CAUCUS developed by Camber-Roth, Inc. and distributed by Metasystems Design, Inc. This conference was named AMERIDIPL. Overall their experience was reported as being 'positive' (Roberts, 1988).

Rochester Institute of Technology in New York currently offers distance education programs in a range of subjects to approximately 700 students each year, delivering instruction largely by print and video supported by telephone contacts. Attempts were recently made via NOTES, a conferencing software to incorporate CC as another component in DE course delivery. Response to this from students and faculty have been reported as positive (Bissell et al., 1987).

NKI, one of the larger non-governmental educational institutions in Norway offers distance learning programs within the vocational/technical field. To enhance its course delivery mechanism NKI has embarked upon a six stage CC project called EKKO which currently has about 500 users (Paulsen & Rekkedal, 1988).

A review comment

The foregoing work on the incorporation of CC in DE comprises a significant contribution to our experience in this regard. In each case the problems encountered were noticeably similar. These related to the communications and conferencing software, the hardware equipment and also user attitudes and their orientations toward the use of the medium. Together, these would have been enough to discourage the most sturdy researchers but this did not happen. Instead there have been indications of a growth in the incorporation of CC in DE activity. Experience has moreover shown that after problems with overall costs of conferencing software and hardware equipment have been sorted out, the following factors will need careful consideration if CC were to make a useful impact in DE.

Firstly, there is the issue of scale. Current applications, excepting that at the UKOU have been with small groups. Can CC work equally well with larger groups? Will it even be possible given the economic disparities in our society? We ought not to lose sight of the fact that one of the earlier arguments in favour of DE itself was that it was liberating formal education from the confines of the classroom and making it available to the masses, especially those who were not able to afford the time or money. The incorporation of CC in DE with its accompaniments and contingencies could very well make DE somewhat an elitist activity and as such defeating its original noble intentions of

being able to reach out to the disadvantaged and the under-privileged.

Secondly, there is the question of integration. It would be naive to suggest a blanket adoption of CC in our existing DE environment. Any incorporation of CC in DE will need to form part of the whole. DE by necessity is best delivered via a multi-media approach. No single medium can claim to successfully deliver the whole course content on its own-- a claim that stands to be supported by the experiences of the UKOU, the University of the South Pacific (USP) and Athabasca University, to name only a few. Moreover, the incorporation of CC in DE for the sake of novelty will likely lead to failure. Like any other medium CC is not suited to all purposes and especially very large enrollments (Bates, 1986). The largest numbers of students we have experimented with is 1500-2000 at the UKOU. What about more than that such as several thousands? What would be the cost implications of this scale of implementation, the administrative and communication infrastructures necessary? We have much too little knowledge and/or experience in this regard but even if we were able to make CC available to the majority, how many of the students might want to or be able to use it. The use of coercive methods has been suggested but that carries a rather negative connotation.

Thirdly, there is the issue of optimization. CC will have to be incorporated where it will make a difference and not just

replace one medium with another or perhaps an existing better one with an unsuitable but glamorous one.

The nature of distance education activity

Over the last quarter of a century there has been a tremendous growth in DE activity world over. While some of these have been quite systemically thought through many others have grown to exist rather haphazardly. Existing distance education literature including attempts at defining DE, fairly accurately reflects this multifarious character of DE activity. This enumeration of the nature of DE activity is based on the following definition by Tight (1988).

> Distance education refers to those forms of organised learning which are based on the physical separation of learners and those (other than the learners themselves) involved in the organization of their learning. This separation may apply to the whole learning process or only to certain stages or elements of it. Both face-to-face and private study may be involved but their function will be to supplement or reinforce the predominantly distance interaction.

Generally speaking then, distance education activity is identifiable by four larger spheres of activity operational in concert. These are:

1. the **subject-matter** or content, that which is being taught and learned.
2. the **learners**, the recipients in the activity.
3. the **organization**, that is the educational or training institution which is responsible for all aspects of the administration of the DE activity, and

4. the **delivery mode**, the communication media that is responsible for carrying the subject-matter from the organization to the learners.

Potentials for CC applications in DE

Applications of computer conferencing in DE to-date have largely focussed on the learners and the learning activity. At OISE, the UKOU, NYIT, NKI and the Empire State College, the major focus of CC activity has been on enhancing the learning process by encouraging group learning activity among students, peer counselling and also, improving the facilitating functions of the tutors. Some attempts have been made at also using CC, such as at the UKOU and OISE for joint project-work by students but that too has been concerned with the learning activity per se. Between Deakin University in Australia and the UKOU plans are afoot to use CC for a slightly different purpose, that is to develop a post-graduate study program in curriculum development (Castro et al., 1986).

Clearly a lot more can and ought to be done with CC in DE before its value can be fully realised. A major area of potential application is **course materials development** activity. Distance educators around the world have experimented with a wide variety of approaches to this activity and have increasingly come to adopt some variation of a team approach (Naidu, 1988). Course materials development activity for DE is usually a very rigorous process which draws upon a range of skills from subject-matter expertise to design, development and production related skills.

As a single person is rarely likely to possess all or even most of these skills, a team approach is the most suitable strategy to adopt for such a large task. This point has been made abundantly clear at the UKOU and other similar institutions engaged in DE activity elsewhere.

Team work entails group work and research has shown that CC can enhance group work (Harasim, 1986; Mason, 1987; Davie, 1988). If adopted, course team managers for example, will likely find appropriate use of CC relieving them from much administrative chore related to course development activity. Team participants will likely find the medium permitting them a lot more flexibility with time especially, to reflect upon one another's contributions while engaged in an on-line conference amongst themselves. No longer would course team participants have the necessity to sit together for long (often rather boring!) hours over one another's manuscripts, as they currently tend to do in face-to-face course team meetings. Much of the thinking and 'talking' could now be done on the conferencing system and with improvements in the word-processing capability of current conferencing software, this could become a very pleasant exercise.

Moreover with the incorporation of CC in course materials development activity in DE, team membership need not be constrained by people on-board or about an institution. Expert input could be drawn from as far as another country. A UKOU course team for example, could have members in it drawn from

Canada and the vice versa would also be possible. Students also could be invited to make an input in the team's effort which would not have been possible otherwise because of their separation from the location of the course development activity.

Consider the potential of this capability of CC for international collaboration in course development activity such as that which the newly formed Commonwealth of Learning Agency might likely be engaging in. A subject-matter expert with rare skills in say tropical marine biology is based in the South Pacific, another in the Caribbean and another in say Indonesia. The educational technologist is based in the United Kingdom or in Vancouver, Canada and a DE course in tropical marine biology needs to be developed. To get these four experts together in one location for any length of time will be very expensive, but even if money were made available, it is unlikely that they could afford the time to leave their natural resource base and standing commitments for Vancouver or London to work on a task such as this. CC can be suitably employed to get this project going without necessitating movement of any one from his or her station. With extensive satellite tele-communications facility now spanning the globe, CC has the potential to draw upon the best minds irrespective of their locations to develop the best courses for all to share. There will be no doubt, some technical difficulties with establishing such a communication for a start but nothing I believe, that will be impossible to fix.

Computer conferencing has potential in the management of distance education infrastructures as well. DE administrative infrastructures are usually decentralised, making regular staff meetings not all too convenient. As an example-- the University of the South Pacific has a decentralised and regional DE operation and uses satellite audio tele-conferencing for weekly meetings of local centre and headquarters staff. For local centre staff especially, this means being present in their satellite transmitting studios in person often with a satellite terminal operator as well. Such a gathering across several time zones means for some at least, being present for meetings at pretty odd times of the day. A good computer conferencing system using existing satellite tele-communications facilities would not necessitate any of this. A lot of the routine meetings can be held on-line, the agenda for which could be jointly prepared-- all the more democratic administration! Conferences on matters of limited interest may also be created such as between a few centres with similar concerns or interests and open for others to join in or closed if desired. A conference manager could help keep overall control of this. As an added boon transcripts of these conferences would be almost immediately available on hardcopy. Secretaries who currently spend long and tiring hours in transcribing audio tele-conference proceedings will be greatly relieved. Consider the amount of time saved in this arrangement by staff who could now choose to join meetings of relevance and interest to them and at times convenient to them. Consider also

the advantage of being able to create or join conferences dealing with common or interesting concerns none of which is possible under the current system without much ado. The incorporation of CC in the management of DE systems has the potential of creating a futuristic, free-wheeling and democratic work space for routine administrative tasks that we all know tends to take so much of our valuable time leaving us with little else for more creative thought and work.

Prospects and directions for the future

I have attempted to show in the preceding section that CC has a lot more to offer in the DE environment than has been attempted to-date. From the management of a DE system, to course materials development and delivery, through to learner support, CC with careful and considered implementation, I believe can make a difference in the practice of distance education. In this final section of the paper I will be considering some of the larger societal and possibly global implications of the incorporation of CC in DE environments.

Foremost is the inherent capability of CC to bring people, groups, communities and societies closer to each other without necessitating physical movement. Such a potential development will concomitantly entail a much greater proliferation and sharing of knowledge, ideas and skill-- a kind of 'meme' generation that in sum will lead to a richer society (Gengle, 1986). Much of our formal education system is heavily

constrained by tight bureaucratic structures and conventions that do not allow for knowledge to be easily shared nor innovation to take hold. Distance education is free from a lot of these traditional constraints of academe. It is formal education in its 'liberated' form with the mandate to carry the message to the poor, and the under-privileged and to those constrained by time and space. CC is similarly disposed and has the potential to assist in this role of DE. Distance education sometimes can alienate the learner a little too much by individualising his instruction. Not all learners prefer this kind of learning. Not all distance learners are highly motivated enough to persist through on their own. Many would like a little bit of company, a little more peer support, a little more feeling of collegiality, a feeling of belonging to the wider community of learners, participants in a common experience. CC has the capability of bringing the community of DE learners closer together without necessarily imposing on them the conventions of face-to-face education.

CC has the potential of 'humanising' distance learning by artificially recreating some of the useful features of a traditional learning environment but without its norms and practices (Mason; 1988). By bringing learners, and tutors with learners closer to one another and helping them sustain their motivation it might even help the notoriously high attrition rate in DE programs. DE literature and experience has shown that distance learners dropout of their programs not because of

ineffective instruction and/or instructional materials but because of personal circumstances such as a waning of enthusiasm, alienation and general difficulty in coping with unrealistic targets set earlier on in the program (Paul, 1988). A little bit of collegiality, peer support and empathy could restore this much needed motivation and salvage yet another dropout. But much of this is speculative and based on experience only. A lot more rigorous research needs to be carried out in this direction before any substantive conclusions can be drawn. We need to know if CC can live up to this expectation and the only way we will is by trying it out.

The use of CC in the management of distance education activity and in instructional materials development for DE, as explicated earlier will mean a better management of limited resources namely time and money. The DE administrator is like any one else, constrained by sufficient time and resources, a lot of which we know is taken up by 'administrivia'. Appropriate use of CC has the potential to salvage a lot of it. In addition, both the management of DE and course development activity are in the care of smaller groups of people and research has shown that CC works better with smaller groups of people (Kaye, 1987).

Finally, despite the declining costs of conferencing equipment, it is unlikely that in the foreseeable future most distance learners will be having ready access to it and therefore always at a disadvantage from those who will. It would be better, in my judgement to make available CC as a supplementary

course delivery mode and as an alternative learner support arrangement so as not to disadvantage those unable to access it or deny those who can and want to benefit from the medium. CC has useful unique features that are particularly suited for certain kinds of DE activity more than others (Bates, 1986). My argument is for adopting the facility at least initially, where existing modes of communication are falling short of expectations such as in the administration of DE and in course materials development activity.

Conclusion

Optimism toward the potential of CC in DE has to be cognizant of its limitations. Experience with existing conferencing software has shown us that there is much need for research and development work there. For example, there is no substantive documentation on which conferencing software is suitable for what kind of purpose, the cost implications of each and scope for modification to suit individual user needs. We have some experience to go by on this but this needs to be documented, built upon and made available for public consumption. A computer conference on the scope and potentials of conferencing software itself may prove a very useful first step in this direction.

Moreover, suitable software and access to the equipment will not necessarily ensure conferencing either. A considerable amount of thought and planning is necessary in getting

participants conferencing effectively. There is, especially amongst academe a certain negative disposition (apathy if you like) towards CC and micro-technology in general. Many view these innovations in their work space as a threat to their establishments believing that their proliferation will sooner or later make their own skills obsolete. While some do readily cope with the new environment others remain negatively disposed and often determined to throw a wench into the works if they could. There are yet others who will convincingly argue that technology 'empowers' (Harasim, 1986). How might one go about addressing these not too uncommon scenarios? Raving on about the remarkable potentials of CC or for that matter any other new technology with the spirit of a crusader will not get us very far. We must be in a position to show to the potential user how exactly might CC work in a DE environment and how might it be incorporated as part of the integrated whole. These very specific questions need answering and to do so we may have to reach out into areas beyond education, such as communications theory and into the literature on change and innovation adoption (Naidu, 1988). There is potential for CC in DE but much needs to done before it will be widely embraced.

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